SN-US025009

PATENT APPLICATION

for

BOOT LINER

Inventor:

Shuichi Hirayama

Assignee:

SHIMANO INC.

BOOT LINER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention generally relates to a boot liner. More specifically, the present invention relates a sport boot liner or snowboard boot liner that is comfortable to wear.

2. Background Information

Many cold weather footwear have an internal boot liner that is separate from the outer shell of the footwear. For example, hiking boots, ski boots, snowboard boots and the like often have a boot liner. The boot liner provides thermal insulation, shock absorption, comfort, etc. for the wearer's foot and/or the lower part of the wearer's leg. The boot liner is typically formed with a sole and an upper portion. The upper portion is often formed with a central opening or slit. Some times a tongue is formed on a lower end of the opening or slit, the tongue extending between the sides of the central opening or slit.

It is important to keep the liner in contact with the wearer's foot. Thus, the boot liner is sometimes provided with a tightening device. The tightening device is typically positioned on the sides of the central slit and usually includes loops or eyelets with a lace extending through the loops or eyelets. The lace typically extends through the loops or eyelets in a criss-cross manner, e.g., going from side to side through the loops and eyelets. Typically the eyelets or loops are formed on opposite sides of the opening in equal numbers at equally spaced apart intervals, defining pairs of eyelets or loops.

Boot liners are formed of a variety of materials such as woven fabrics, sponge like materials or rubber, or various combinations of these materials. Some boot liners are provided with a tightening device that can tighten the boot liner around wearer's foot.

One example of a boot liner with a tightening device is disclosed in U.S. Patent No. 5,937,542, assigned to Solomon S.A. This patent discloses a tightening device for a boot liner that uses a single cord and a plurality of straps to tighten the boot liner about the wearer's foot.

Recently, the boot liner has been redesigned to provide the wearer with a more comfortable fit. For example, U.S. Patent No. 5,924,218 assigned to Salomon S.A. discloses a boot liner that utilizes thermo forming material to provide a better fit.

In view of the above, there exists a need for snowboard boot liner which is comfortable to wear. This invention addresses this need in the prior art as well as other needs, which will become apparent to those skilled in the art from this disclosure.

SUMMARY OF THE INVENTION

One object of the present invention is to provide a snowboard boot liner that is comfortable to wear.

Another object of the present invention is to provide boot liner, which is securely tighten about the wears ankle.

The foregoing objects can basically be attained by providing a snowboard boot liner comprising a sole portion and an upper portion. The upper portion has a foot section fixedly coupled to the sole portion, an ankle section extending upwardly from the foot section and a leg section extending upwardly from the ankle section. The upper portion includes a thermoformable layer located on an inner side and an outer side of the ankle section and a first non-thermoformable member located in one of the inner and outer sides of the ankle section.

These and other objects, features, aspects and advantages of the present invention will become apparent to those skilled in the art from the following detailed description, which, taken in conjunction with the annexed drawings, discloses a preferred embodiment of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring now to the attached drawings which form a part of this original disclosure:

Figure 1 is a side perspective view of a boot liner in accordance with the present invention;

Figure 2 is a front perspective view of the boot liner illustrated in Figure 1;

Figure 3 is an enlarged, partial cross-sectional view of the boot liner illustrated in Figures 1 and 2 as viewed along section line 3-3 of Figure 2;

Figure 4 is an enlarged, partial cross-sectional view of the boot liner illustrated in Figures 1-3 as viewed along section line 4-4 of Figure 3;

Figure 5 is a partial cross-sectional view of a portion of the boot liner illustrated in Figures 1-4 as viewed along section line 5-5 of Figure 4; and

Figure 6 is a partial cross-sectional view of a portion of the boot liner illustrated in Figures 1-5 as viewed along section line 6-6 of Figure 4.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring initially to Figures 1 and 2, a boot liner 10 is illustrated in accordance with a preferred embodiment of the present invention. The boot liner 10 is preferably designed to be used with a sport boot (not shown) or the like. More specifically, the boot liner 10 is designed to be inserted into a shell of a sport boot such as a snowboard boot (not shown). The boot liner 10 allows for a tight fit around the foot and lower leg of the wearer. More specifically, the boot liner 10 of the present invention allows a tight fit around the ankle area of the wearer.

It would be apparent to the one skilled in the art from this disclosure that the boot liner 10 can come in a variety of sizes to accommodate various sizes of feet. In other words, the boot liner 10 is so dimensioned to correspond to a particular size of foot for a particular size of boot liner. As explained below, the boot liner 10 is especially constructed to provide a tight fit around the ankle area of the wearer. Thus, for a given size of foot, the boot liner 10 is shaped to snuggly fit the ankle joint A which is basically comprised of three bones, i.e., the tibia which forms the inside or medial portion of the ankle joint, the fibula which forms the lateral or outside portion of the ankle joint and the talus that forms the underneath of the ankle joint. The boot liner 10 of the present invention is designed based on the average location of the ankle joint A formed by the tibia and the fibula portions of the ankle joint A to a particular size of foot.

The boot liner 10 basically includes a sole portion 12, an upper portion 14 coupled to the sole portion 12 and a tightening device T coupled to the upper portion 14 for drawing opposite lateral sides of the upper portion 14 together via a lace or cord L. As used herein, the following directional terms "forward, rearward, above, downward, vertical, horizontal, below and transverse" as well as any other similar directional terms refer to those directions of the boot liner 10 in the normal upright

position. Accordingly, these terms, as utilized to describe the present invention should be interpreted relative to a wearer's foot with the boot liner 10 in the normal upright position.

As best seen in Figure 4, the sole portion 12 is preferably a separate element that is coupled to the upper portion 14 in a conventional manner such as by sewing the two portions together. Preferably, the sole portion 12 is preferably different from the upper portion 14. The sole portion 12 is preferably a two part construction with each part being constructed of two layers of flexible material. Specifically, the sole portion 12 has an outer sole section 15 that is sewn to the upper portion 14 and an inner sole section 16 the removably overlies the outer sole section 15.

More specifically, as seen in Figure 4, the outer sole section 15 should have a bottom outer layer 15a and an inner layer 15b. This layered configuration is preferably bonded together in a conventional manner such as with adhesives. In the drawings, the thickness of each of the layers 15a and 15b is not drawn to scale. Rather, the thickness of the layer 15a has been exaggerated for purposes of illustration.

The outer layer 15a of the outer sole section 15 is constructed of a material having a high coefficient of friction. In other words, when the boot liner 10 is located within the boot (not shown) the sole portion 12 will frictionally contact the inner surface of the boot to limit relative movement therebetween. The outer layer 15a of the outer sole section 15 is preferably constructed of a flexible rubber material such as a synthetic rubber, a polyvinyl chloride (PVC), ethyl vinyl acetate copolymer (EVA) or leather or any other suitable material. The bottom surface of the outer layer 15a of the outer sole section 15 is preferably textured to increase the non-slip characteristics thereof. The inner layer 15b of the outer sole section 15 is preferably formed of a thermoformable material such as ULTRALON, which can conformed the bottom of the foot. In other words, the thermoformable inner layer 15b of the outer sole section 15 has thermoplastic qualities rendering capable of being adjusted and/or adapted after being heated at its thermoforming temperature, to the specific volume of the wearer's foot.

As seen in Figure 4, the inner sole section 16 is preferably a removable insert that overlies the outer sole section 15. The inner sole section 16 is preferably

constructed of a bottom layer 16a and an upper layer 16b. This layered configuration is preferably bonded together in a conventional manner such as with adhesives. In the drawings, the thickness of each of the layers 16a and 16b is not drawn to scale. Rather, the thickness of the layer 16b has been exaggerated for purposes of illustration. The bottom layer 16a of the inner sole section 16 is preferably constructed of a compressible, flexible material such as an ethyl vinyl acetate copolymer (EVA) that provides a cushion for the wearer's foot. The upper layer 16a of the inner sole section 16 is preferably formed of a polyester fabric or textile material.

The upper portion 14 is preferably constructed of two parts, e.g., a main part 17 and a tongue part 18. These parts 17 and 18 are sewn together by stitching 19 to form a foot section 20, an ankle section 21 and a leg section 22. The foot section 20 is fixedly coupled to the sole portion 12 in a conventional manner, preferably by stitching 21. The ankle section 21 is located in the area between the foot section 20 and the leg portion 22. The leg portion 22 extends upwardly from the foot section 20 with a longitudinal slit 24 formed in both the foot section 20 and the ankle section 21. The longitudinal slit 24 is substantially located along the middle or median plane of the boot liner 10. Thus, the longitudinal slit 24 is defined by a pair of opposite lateral sides 26a and 26b of the upper portion 14. Preferably, the longitudinal slit 24 extends along both the foot section 20 and the leg section 22.

As seen in Figures 3-6, each of the parts 17 and 18 of the upper portion 14 is constructed of four layers of flexible materials as best seen in Figures 5 and 6. More specifically, the upper portion 14 has an outermost layer 28a, an outer intermediate or thermoformable layer 28b, an inner intermediate or spongy layer 28c and an innermost layer 28d. This layered configuration is preferably bonded together in a conventional manner such as with adhesives. In the drawings, the thickness of each of the layers 28a-28d is not drawn to scale. Rather, the thickness of each of the layers 28a and 28d has been exaggerated for purposes of illustration.

In the preferred embodiment, the outermost layer 28a is preferably constructed of an elastane material such as spandex. The outermost layer 28a preferably has a lateral thickness or dimension of approximately 0.3 millimeters to approximately 0.5 millimeters. The outer intermediate (thermoformable) layer 28b is preferably

constructed of a thermoformable material such as ULTRALON. The thermoformable layer 28b has thermoplastic qualities rendering capable of being adjusted and/or adapted after being heated at its thermo forming temperature, to the specific volume of the wearer's foot. The thermoformable layer 28b preferably has a lateral thickness or dimension of approximately 7 millimeters. The inner intermediate (spongy) layer 28c is preferably constructed of a conventional foam or sponge material such as an open cell polyurethane. The inner intermediate layer 28c preferably has a lateral thickness or dimension of approximately 3.5 millimeters. The innermost layer 28d is preferably constructed of a cloth material such as a NYLEX® polymer knit fabric. The innermost layer 28d preferably has a lateral thickness or dimension of approximately 0.3 millimeters to approximately 0.5 millimeters. Of course, it will be apparent to those skilled in the art from this disclosure that the upper portion 14 can be constructed of other suitable flexible materials that will carry out the present invention.

As seen in Figure 3, the ankle section 21 has a pair of non-thermoformable members 29 located in the inner and outer sides of the ankle section 21. As seen in Figures 5 and 6, the first and second non-thermoformable members 29 are preferably located between the thermoformable layer 28b and the inner spongy layer 28c. The first and second non-thermoformable members 29 are banana-shaped or L-shaped pads that are preferably formed of a polyurethane material. The first and second non-thermoformable members 29 form a pair of banana-shaped or L-shaped bulges B that extend laterally towards each other.

As seen in Figure 4, each of the first and second non-thermoformable members 29 has a vertical height or dimension D_1 of approximately 70 millimeters and a horizontal length or dimension D_2 of approximately 70 millimeters. The non-thermoformable members 29 preferably have a lateral thickness or dimension D_3 of approximately 11.5 millimeters. The tightening device T is arranged and configured on the upper portion 14 such that first and second strap portions overlie parts of the non-thermoformable members 29 as best seen in Figure 4.

The non-thermoformable members 29 are positioned just rearwardly of an average location of the fibula and tibia that form portions of the ankle joint. In other words, the non-thermoformable members 29 basically cradle or support the ankle joint

at the bottom and rearward sides of the ankle joint A. Of course, it would be apparent to those skilled in the art from this disclosure that for each size of boot liner 10, the location of the non-thermoformable members 29 should be located based on the average location of the ankle joint A for a wearer's foot that is sized for the particular size of boot liner 10.

The density of the thermoformable material forming the thermoformable layer 28b is preferably around 50 kg/m3 and has a hardness of approximately 35-40 on a rubber hardness tester C scale of the Japan Rubber Association. On the other hand, the polyurethane material of the non-thermoformable members 29 preferably have a hardness of 20 on the rubber hardness tester C scale of the Japan Rubber Association. The polyurethane material of the non-thermoformable members 29 is denser such that the non-formable members 29 are not as compressible as the spongy layer 28c. Thus, the thermoformable layer 28b is harder than the inner intermediate layer 28c and the non-thermoformable members 29. The non-thermoformable members 29 are preferably harder than the spongy layer 28c. Preferably, both the spongy layer 28c and the non-thermoformable members 29 are formed of a polyurethane material. However, the non-thermoformable members 29 are not as dense as the thermoformable layer 28b such that the non-thermoformable members 29 are more compressible in the lateral direction than the thermoformable layer 28b.

As seen in Figure 3, the tongue part 18 is arranged to span the longitudinal slit 24 as seen in Figures 1 and 2. The tongue part 18 is preferably constructed of four layers 30a, 30b, 30c and 30d. Preferably, the materials of the layers 30a, 30b, 30c and 30d corresponds to the same materials used for the layers 28a, 28b, 28c and 28d of the main part 17 of the upper portion 14, respectively. Accordingly, the tongue part 18 is constructed of a flexible cushioned material, which is preferably the same flexible cushioning materials used for the main part 17 of the upper portion 14. This layered configuration is preferably bonded together in a conventional manner such as with adhesives. In the drawings, the thickness of each of the layers 30a-30d is not drawn to scale. Rather, the thickness of each of the layers 30a and 30d has been exaggerated for purposes of illustration.

The tightening device T is coupled to the upper portion 14 for drawing opposite lateral sides 26a and 26b of the upper portion 14 towards one another. The

tightening device T basically includes an upper lacing member 32 and a lower lacing member 34. The upper and lower lacing members 32 and 34 are sewn via stitching to the upper portion 14 at four rearwardly located points 35 (only two points shown in Figure 1). The lower lacing member 34 also has its two lateral bottom portions glued to the outer sole section 15 at side points 36 (only one point shown in Figure 1). The upper lacing member 32 includes four (two pairs) upper strap or lacing portions 41, 42, 43 and 44, while the lower lacing member 34 includes a pair of lower strap or lacing portions 45 and 46. The upper lacing member 32 primarily tightens the leg section 22 of the upper portion 14, while the lower lacing member 34 primarily tightens the ankle section 21, which is located at the intersection of the foot section 20 and the leg section 22. Of course, it will be apparent to those skilled in the art from this disclosure that depending upon the size of the boot liner 10 and its desired used, fewer or more primary lacing portions can be utilized to carry out the present invention.

The strap or lacing portions 41-46 are preferably constructed of conventional strap material that is commonly used in the art. The strap or lacing portions 41-46 are constructed of a flexible material such as leather, nylon or any other suitable material. Of course, a variety of arrangements can be utilized. For example, the lacing portions 41-46 can be merely eyelets or holes formed directly in the upper portion 14. Alternatively, the lacing portions 41-46 can be formed as hooks and/or rigid ring members.

The tightening device T is positioned on the sides of the central slit 24 with the cord L extending through the looped members formed by the lacing portions 41-46. The cord L typically extends through the looped members formed by the lacing portions 41-46 in a criss-cross manner, e.g., going from side to side through the loops. Typically, the looped members formed by the lacing portions 41-46 are located on opposite sides of the central slit 24 in equal numbers at equally spaced apart intervals so as to define pairs of looped members.

The terms of degree such as "substantially", "about" and "approximately" as used herein mean a reasonable amount of deviation of the modified term such that the end result is not significantly changed. These terms should be construed as including

a deviation of at least ± 5% of the modified term if this deviation would not negate the meaning of the word it modifies.

While only selected embodiments have been chosen to illustrate the present invention, it will be apparent to those skilled in the art from this disclosure that various changes and modifications can be made herein without departing from the scope of the invention as defined in the appended claims. Furthermore, the foregoing description of the embodiments according to the present invention are provided for illustration only, and not for the purpose of limiting the invention as defined by the appended claims and their equivalents.